THE PRACTICAL CARPENTER

Vol. IV JANUARY, 1906 No. 1

RUINS AT PERSEPOLIS, PERSIA

PUBLISHED MONTHLY AT TWENTY-FIVE CENTS A YEAR BY

The INDUSTRIAL PUBLICATION CO.

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VOL. IV. JANUARY, 1906. NUMBER 1

HINTS FOR HOUSE BUILDERS.—IV.

By ALBERT FAIR.

Having, in previous articles, treated of the foundation and cellar, we will now take up the subject of drainage.

DRAINAGE.

If the house is within the precincts of a town or city, then the drainage will not be difficult, and a few general hints will be sufficient to guide the house builder. In this case the whole of the drainage should start from below the foundation walls, and all pipes should be connected at one point if possible, and there the main drains should lead to the outfall or main sewer. In all cases the drains should discharge into the top or upper portion of the sewer, and a short elbow, with its mouth downward, is the best termination for a drain pipe.

All soil pipes should be connected so as to discharge into the head of the drain at such points as will permit water, waste and overflow pipes to empty behind them.

When one drain connects with another, the angle should be as acute as possible, so that the combined currents will readily unite. The Y junction should always be used for this purpose.

All drains should have ready means of access so that they may be examined at frequent intervals, both inside and outside of the dwelling, particularly at junctions and angles. If the length is great, it is well to enlarge their diameter and increase their fall.

Great care should be taken to make the joints of the pipes perfectly smooth inside and to remove the cement or mortar that may have fallen into them. This precaution is too frequently omitted, and the consequence is that increased friction caused by these irregular projections in the joints, and by obstructions formed along the pipes by cement, which in time becomes as hard as stone, prevents the free flow of water and forms the beginning for sediment and other deposits which eventually choke up a drain.

Too often the laying down of drain pipes is intrusted to ignorant or careless men, and the proper precautions not taken to see that the joints are water-tight, and as a consequence the joints leak and the soil becomes saturated with the foul matter, and often waste pipes discharge into an open untrapped junction out of which the gas from the sewers is constantly spreading under the floor and ascending through the house.

All drains should be perfectly ventilated, as the flow of foul air is always inverse to the flow of the current through the pipe. The foul gas collects at the head of the drain, just outside of the walls, where a trap is sometimes placed with a grating to prevent rats from entering the house by this means. From this point an upright pipe should be carried up as high as the cornice of the house, and from thence conducted

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under the roofing boards into a separate flue of the kitchen chimney as being the warmest chimney in the house. If not convenient at that point, it may be carried to any other separate flue. The object of warming the pipe at this point is to rarify the air in the pipe and thus cause a draft. It is not wise to run this ventilating pipe into the chimney flue, for it sometimes happens that, from adverse winds and other causes, there may be a back draught, in which case the poisonous gas might be driven down the flue into the rooms below and cause serious results. When building flues it would be as well to provide an extra one for the purpose in one or more of the chimneys that will be in frequent use.

It may be necessary, on account of danger from frost or other reasons, to place a trap at the metal drain at some part within the house, then an upright ventilating shaft may be taken from that point and conveyed as above mentioned.

If the drain has a long distance to run outside the house, and passes under an outbuilding, a ventilating shaft might be placed there also, and carried up above the building, which would partly interrupt the flow of gas towards the head of the drain pipe.

Wherever a water-closet is placed, a pipe should be carried up from below the head of the trap into some convenient flue, and also another from above the seat, and sufficient space left between the door and the floor to allow of a free draught of fresh air inwards.

Some have an idea that if there is a trap to a pipe no foul gas can find its way through the water contained in it; this is not always the case. To a certain extent the trap is a great safeguard, but a heavy pressure of gas will force its way through it, particularly after an extra heavy flow of water in the trap, and, therefore, all sinks should be supplied with small ventilating pipes over them.

The flooring over all junction traps and bends, and particularly where the descending soil pipe connects with the drain, should be so arranged as to give an easy access to those parts in case of fouling.

It should be borne in mind by the reader that fevers and diseases are generated in the system, not in the daytime when the doors are constantly being opened and the air kept circulating, but in the still night when the system is depressed and every door shut; then an exhausting action takes place in the heated house, and the foul gas, escaping from defective joints to drains, and from ill-constructed connections, is carried up between the studding of partitions and under floors and inhaled into the lungs of the unconscious sleeper, whose blood thus becomes infected with the poison. These are facts, and no one who builds a house should neglect to adopt the precautions recommended.

The foregoing on drainage was written more especially for buildings adjacent to a town or city that is provided with a thorough system of sewers, but a great many of the hints and suggestions we have made will apply to village and country houses, about which more will be said in the next article.

THE STRENGTH OF MATERIALS.—IV.

By Charles G. Peker.

It will be well to remember the following facts and data relating to beams.

From an examination of the rules given we can examine the comparative strength of beams loaded in different ways. If we call the strength of a

Beam fixed at one end and loaded at the free end............ = 1, then
Beam fixed at one end and uniformly loaded............... = 2;
Beam supported at both ends and loaded at the middle........ = 4;
Beam supported at both ends and uniformly loaded............ = 8;
Beam fixed at both ends and loaded at the middle............. = 8;
Beam fixed at both ends and uniformly loaded............... = 12;
Beam fixed at one end, other end supported, and loaded at the middle .... = 5 1-3;
Beam fixed at one end, other end supported and uniformly loaded .... = 8.

These rules also indicate that the strength of a rectangular beam varies directly as its breadth and the square of its depth. From this it will be seen that by placing the longest side of the beam in a vertical position it will have greater strength than by placing the short side vertically, because the strength increases as the square of the depth; on the other hand, the strength increases directly as the breadth. For instance: Take a beam whose sides are 10 and 3 inches, then placing the longer side vertically we have

$$10^2 \times 3 = 300$$

and placing the shorter side vertically we have

$$3^2 \times 10 = 90$$

This shows that when the beam is placed with its longer side vertically it is much stronger than when placed with its short side vertically.

A beam uniformly loaded can sustain twice as much as when loaded at the center.

It should also be noticed that by increasing the length of a beam we decrease its strength. Hence it is said that the strength of a beam increases inversely as its length.

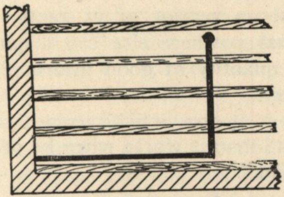

Fig. 1.

The material at the top and bottom of a beam gives it its strength, and to cut notches for pipe recesses is bad practice. As the weakest point of a beam is in the middle of its span, it is more dangerous to cut a recess here. Gas pipes, when the chandelier is to be in the middle of the room, should therefore be placed in a recess cut in the beams near the wall, as shown in Fig. 2, and the pipe run out to the middle of the room. The ararrangement shown in Fig. 1 should never be used, as it takes material from the beam at the point where it is needed the most.

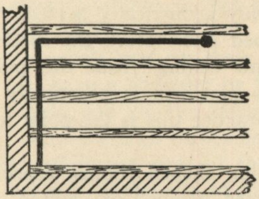

Fig. 2.

If a knot should be in a beam near or at the top or bottom, the beam should be placed so that the knot will be nearest the top, as this portion of the beam will be in compression, as shown in Fig. 3; the fibres of the wood will be pressing on the knot from both sides, keeping it in place. If the beam is placed with the knot at the bottom, as shown in Fig. 4, the fibres here being in tension would pull away from the knot at each side, thus making the beam weak if not making it break or fracture.

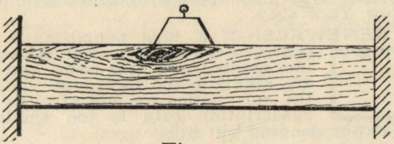

Fig. 3.

For cantilevers, such as beams for projecting balconies, bay-windows, etc., the conditions are reversed and the part of the beam containing the knot is placed at the bottom, as then the fibres are in tension at the top.

If a square beam is supported on its edge —that is, with its diagonal vertical—it will be only .7 as strong as if it rested on its side.

A cylindrical beam is only 1-17 as strong as a square beam whose side is equal to the diameter of the round beam.

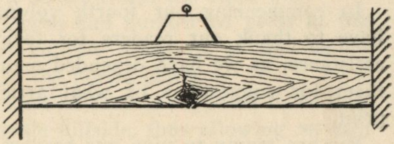

Fig. 4.

The bearing of the ends of a beam in the wall beyond a certain amount does not strengthen it, but the bearing should not be less than $3\frac{1}{2}$ inches except for very short spans.

We have mentioned in our rules that the weight of the beam is neglected. For small beams we can safely neglect the weight of the beam, as it is usually small when compared with the load. In beams of over 20 feet span the weight of the beam should be subtracted from the safe load.

(*To be continued.*)

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VOL. IV.

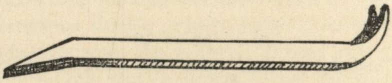
In commencing our fourth volume, we have to thank our readers for their kind assistance, as we have depended mainly on them for suggestions of what articles to print.

We are trying to give our readers what they want, making the PRACTICAL CARPENTER *their* paper, and to accomplish this, we trust to be favored with suggestions as to what would interest them most.

With this issue the majority of subscriptions expire, and we urge upon all to promptly renew. The price is so small that the matter is likely to be overlooked. We receive many complaints about not receiving copies and find that the fault is due to the subscription having expired.

We would like to add many new names to our list beginning with the January issue and make our readers a special offer of three subscriptions for 50 cents. Then by securing two new subscribers you can get your renewal free for your trouble.

Through an accident on the printing-press, the illustration of the pinch-bar described in the article, "A Few of the Tools You Can't Buy," by Emery H. Chase, in our December number, was not printed in the space left for it. We here give this illustration:



BACK NUMBERS.

Volume III of the PRACTICAL CARPENTER contains quite a number of valuable articles that will show how to save time and money for the mechanic.

We have about 30 sets, and while they last, we will send the 12 issues for 1905, postpaid on receipt of 25 cents. We believe that nowhere else can a quarter buy such a quantity of good information about carpentry.

"A bad man is worse when he pretends to be a saint."

ACOUSTICS.

A correspondent sends us a sketch of a church and wishes to know how to remedy its poor acoustic properties.

There are so many things that go to make up or destroy the acoustic properties of a room that it is difficult to say what is wrong unless all points are specified.

The only acoustically perfect room is an egg-shaped one. Here the distance to the walls and ceiling from the point of the speaker's platform is practically the same, and in practice this is the point to be aimed at.

Irregular shaped rooms, especially those with domes, groined or vaulted ceilings, or with large ventilating shafts in center, can never be made good.

The plaster, if it is placed solid on the brick, stone or artificial stone walls, will render an otherwise good room into an inferior one, as will also the lighting, heating and ventilating arrangements.

BARN FRAMING IN SOUTHWESTERN NEW YORK AND NORTHERN PENNSYLVANIA.

By Emery H. Chase.

The present method or system of barn construction in southwestern New York is the result of many changes of general plan, but keeping the original method of framing, namely, that of the boxed mortise-and-tenon style.

This large section of country is largely agricultural, and the building of storage barns and sheds for the shelter of farm crops is one of the main problems for the builder of this locality.

The accompanying drawing shows the general plan of a typical barn frame of a building 38x64 feet, with 16-foot main posts, gambrel roof, basement and double driveway floors.

One point worthy of note as different from other barns is to get height—not width—to get as much under a given amount of roof as possible. That this is an advantage has been so slowly but so well learned that the farmer will tell you the bay or mow is only half full when filled even with the main plates. The weight of the portion to be stored above keeps pressing the lower part down—an advantage lost in the low, wide barn. All of the crops are lifted by means of rope and tackle and carried by means of a steel track and car the full length of the barn just under the ridge of the roof and then dropped to its proper place in the bay or loft over the driveway floors, the power being furnished by a horse team.

Another important principle in the construction of these buildings is that no timbers supporting a heavy load—as beams, cross sills, etc.—shall rest on their tenons alone, but shall have a shoulder or bearing across the whole end of the stick. The drawing will show the ends of beams boxed into the posts, while the ends of the cross sills have a bearing on the end of the basement post below. Good framing also requires that all braces shall not hold against the tenon alone, but shall have a boxing of at least one-half inch depth. This I have tried mainly to show, although I may have failed in a few instances in making the drawing.

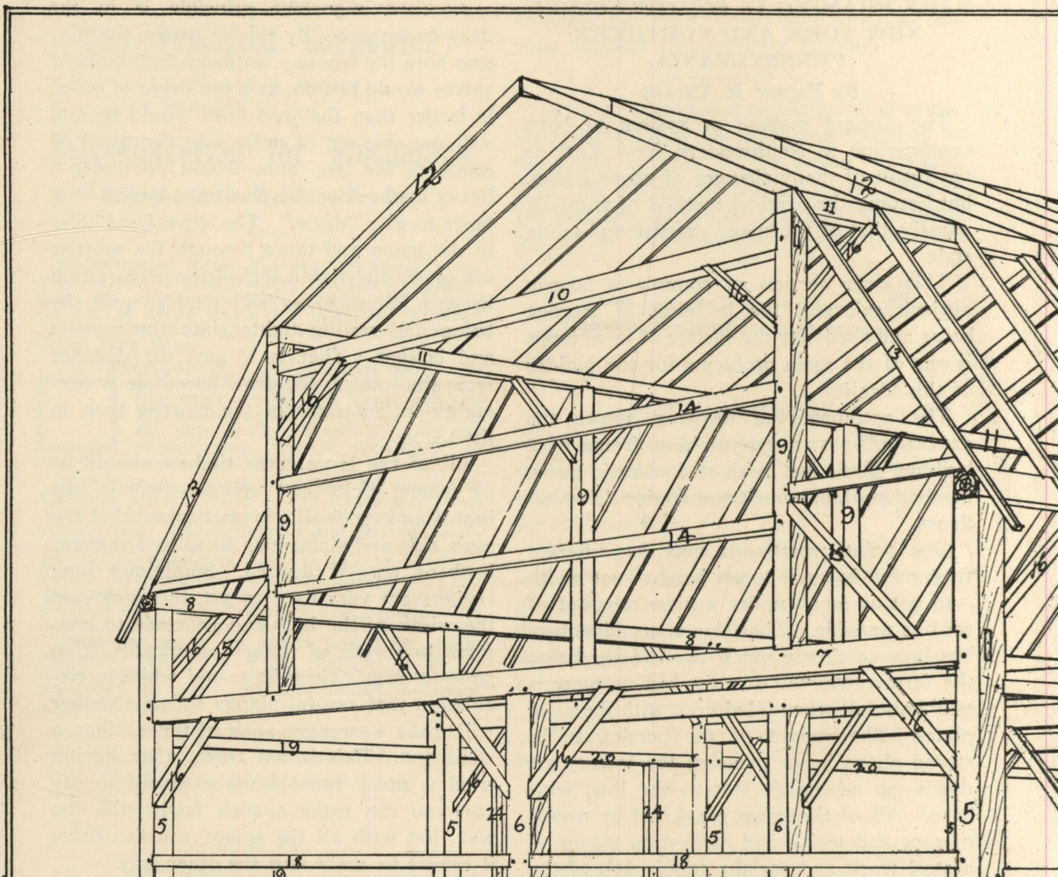
Another important principle is in the draw-bore pins. By this is meant the pins that hold the tenons; ordinary drift bolts or spikes would not do, as a pin made of wood is larger than the iron ones would be and will not side-cut or press into the wood so much as the iron ones would do under a heavy load. Also the pins must have a long taper to give "draw." The draw-bore holes in the tenon and those through the mortise are given one-eighth inch draw or variation in such direction as will tend to pull the tenon and seizing tighter into the mortise and boxing. That is to say, the distance from the joint to the draw-bore hole is one-eighth inch greater in the mortise than in the tenon.

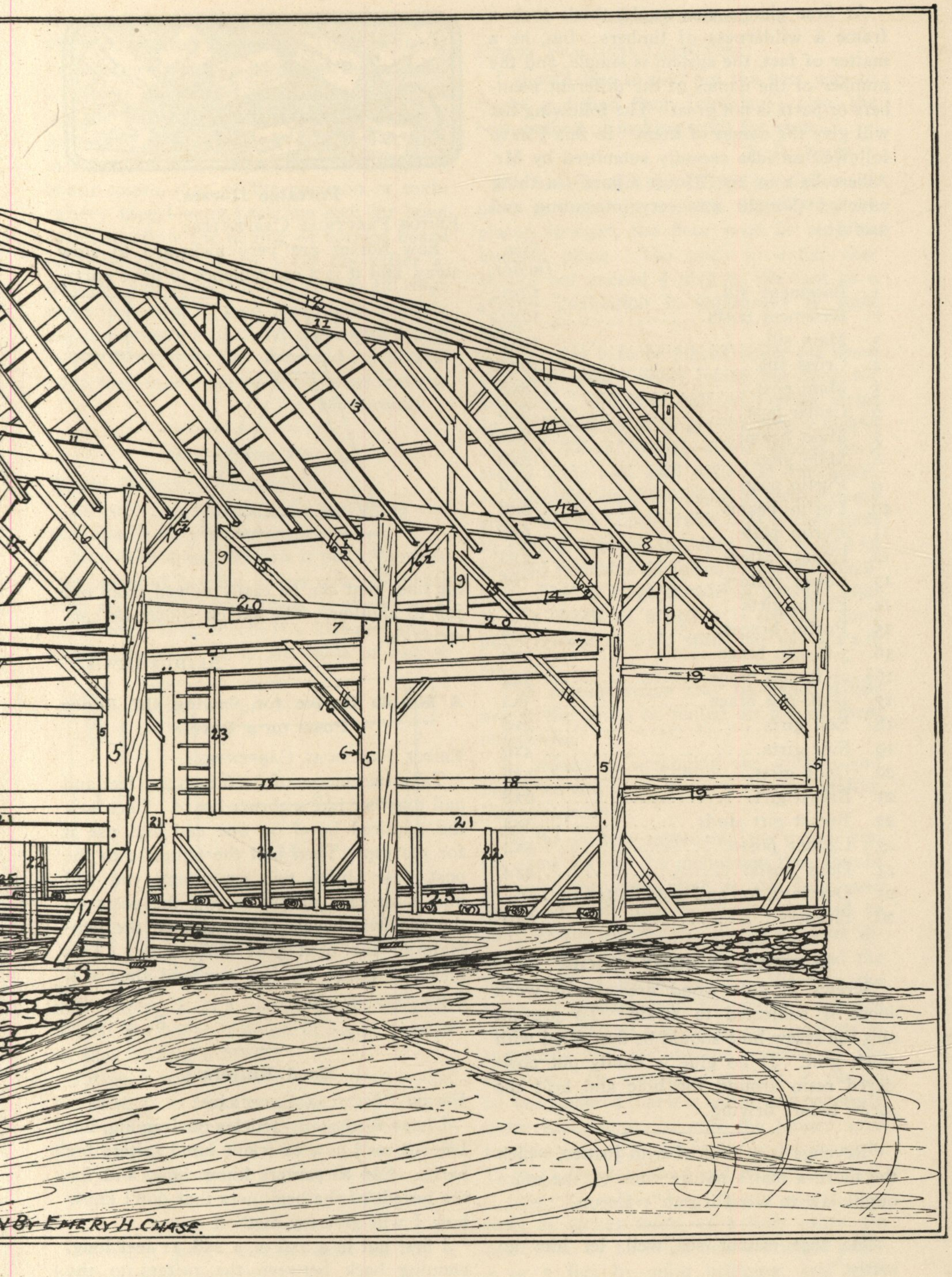
All of the large cross timbers should be of whole sticks—not spliced—that is, the beams and cross sills in particular; but the main sills and plates may be spliced at every bent or post if desired. Sometimes long timbers are very hard to get, in which case the width of the barn can be made to conform to length of timbers obtainable from 30 to 40 feet. There is an old whim in circulation that several planks spiked together will make a stronger stick of timber than a solid one. This is not true; after having tried it many times I am prepared to say you you can make a stick fairly stiff one way, but with all the spikes you can drive it cannot be made stiff the other way.

The length and number of posts in this barn are entirely arbitrary, as well as the height of the purlin plates.

This kind of barn is supposed to be built on a gentle hillside, thus allowing an easy driveway to the main floor of the barn and giving opportunity for a basement underneath to afford valuable storage room for implements and for warm stables.

While there may be kinds of construction which would afford greater strength than that shown in the drawing, this method has been found to answer every purpose, and the added advantage of other methods of framing will not warrant the difference in cost. Besides, this style of barn so fully answers the needs of the farmer that it is being copied in many other localities than those mentioned, namely, Ohio, Wisconsin, Michigan, Indiana and parts of Canada.





N BY EMERY H. CHASE.

At first glance one would think such a frame a wilderness of timbers; but, as a matter of fact, the system is simple, and the number of the names of the different members or parts is not great. The following list will give the names of them. In this I have followed an idea recently submitted by Mr. Albert Fair in his "House Chart"—a thing which I thought was very interesting and useful:

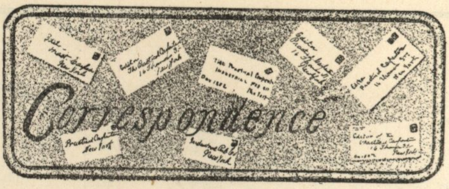
		Size, Inches.
1.	Basement sill	10x12
2.	Basement posts	12x12
3.	Main sill	10x10
4.	Cross sill	10x10
5.	Main post	8x8
6.	Center post	8x8
7.	Main beams	8x10
8.	Main plate	8x8
9.	Purlin posts	6x6
10.	Purlin beams	6x6
11.	Purlin plate	6x6
12.	Upper rafters	2x6
13.	Lower rafters	2x6
14.	Purlin girts	4x6
15.	Purlin braces	3x4
16.	3-ft.-run brace	3x4
16½.	2½-ft.-run brace	3x4
17.	3½-ft.-run brace	3x4
18.	End girts	4x6
19.	Side girts	4x6
20.	Door girts	4x6
21.	Breast girt	6x8
22.	Breast girt studs	3x4
23.	Ladder post	3x4
24.	Door posts	4x4
25.	Overlays, top and ends flatted to	6
26.	Sleepers	6x6

SCREWS IN SOFT WOOD.

Screws in soft wood are apt to work loose if subjected to strain. To prevent this the screw hole should be first filled with thick glue. If no glue is handy put powdered resin around the hole and heat the screw before driving.

"Revenge is a kind of wild justice, which the more a man's nature runs to, the more ought law to weed it out."—Bacon.

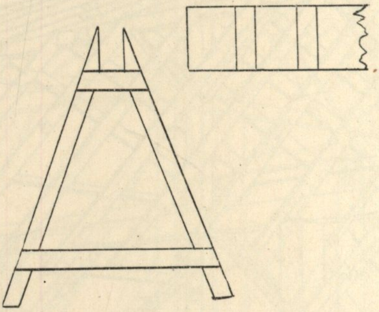
"He that cannot see well, let him go softly."



Portable Horses.

Editor Practical Carpenter:

Saw horses are very awkward to stow away, and it is a convenience to have portable ones that can be easily moved from one job to another. The sketch shows its construction.



Arthur Lewis.

A Simple Device for Sawing Off Fence Posts on a Bevel.

Editor Practical Carpenter:

Take two pieces of ⅞ x 6 inch x 3 feet and nail together like a corner board. Then saw the required bevel on one end and use it for the top. Then nail the template to the post, just plumb two ways, and you will find it an easy matter to saw the posts on the required bevel. Then change the template to the next post and so on. This makes a guide for the saw and they will come very accurate.

F. A. W.

Hood Rafters.

Editor Practical Carpenter:

I have read many articles on framing, but I never read how to frame hood rafters for barns. Old carpenters know how, and for the benefit of the beginners that don't know how I will give my method.

I first put in a 2x6 or a 2x8, 11 feet long, running back between the rafters to the fourth pair from the end of barn, making the hood about 5 feet long. Then I cut my 1x12 cornice board to run from the railroad cornice to the end of hood on each side. I lay the board in position on the common rafter and on the ridge piece. I tack it, then mark on the ridge where the inner edge of board comes, also on the common or main rafter; then I mark back one inch for hood rafter to allow the nailing of cornice board on hood rafter. Then I lay my rafter in position and mark the top end to fit ridge piece first, saw it, then place it in position again, having top of rafter flush with top of ridge, then mark the other end on bottom edge, then square across to top edge and cut.

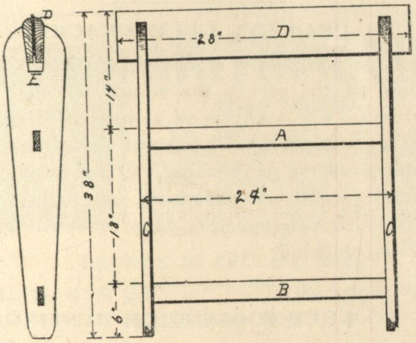
J. M. Shirley.

Saw-Filing Vise.

Editor Practical Carpenter:

Below I give a sketch of a saw-filing vise that can be very easily made.

As will be noted, the saw is put in between two pieces of board 4 inches wide, 28 inches long and about ⅝ inch thick, as shown at D on sketch. B on sketch is a foot-rest and A is the knee-rest. C C are made of 2x4x38 inch pieces. E is a wedge-shaped opening, so that the saw in between D can be pressed in, thus holding it firmly.



Pieces A and B should be mortised in end pieces so as to make the thing solid. When in use lean the vise against something, put the saw in, place your foot on the rest B and your knee against A, and file away.

D. J. Dodrill.

"Without good nature, man is but a better kind of vermin."

Dished Floors.

Editor Practical Carpenter:

I should like to find out the best way to frame a dished floor (circular); also, the best method of making pews for same.

F. R. Amer.

We assume that the church is to have the pews arranged in a circle, for if they are placed straight, the floor need be only an inclined plane. The pitch in either case should not exceed ½ inch to the foot as a greater inclination is unpleasant to walk upon.

If a room is to be placed under the room with the dished floor, frame the floor for an incline, and then nail on furring strips on the joists, so as to get the proper dished effect.. These furring strips should be 2 inches wide and well nailed to the joists. At the outer walls the depth of these furring strips will be considerable, and if they have to exceed 6 inches in depth, they should be bridged the same as joists, to prevent buckling. Use as large timber as possible, that is if a depth of 6 inches is needed, don't build up out of 2 x 2 stuff, but use a 2 x 6, etc.

The furring strips may be either nailed across the joists or nailed on top of them lengthwise.

In regard to arranging the girders and joists we will quote from *Kidder's Building Superintendence:*

"If the girders supporting the incline run the same way as the inclination they should be given the same pitch as the floor, and the joists will then be level from end to end. If the girders run in the opposite direction they will be level endways, and the joists will be on an incline. Whether the joists or girders shall be inclined depends upon the plan of the room, the openings in the walls and the desired spacing of the columns. In arranging girders it should be remembered that it is better, and generally more economical, to give the longer span to the joist and to limit the girder spans to 12 or 13 feet for wood and 16 feet for steel.

Joists 14 inches deep should not be less than 2½ inches thick, as 2 inch joists are apt to fail by buckling unless bridged every 4 or 5 feet by solid bridging, and such bridging will usually cost more than the extra thickness of the joists."

Another method is to set the joists radially and at the proper pitch, the floor being laid directly on the joists, no furring being required. The girders in this case are short and tangent to circles struck from the center used for the circular pews, and one line higher than the other so as to give the proper pitch to the joists when fitted and placed on top.

To fit these joists is a simple matter, as they are practically the same as rafters, and it is only necessary to find the foot cut to have them fit properly on the girders so as to give the required pitch to the floor.

On account of the number of short girders used in this method, the space beneath the room can hardly be used for school room, etc., owing to the columns.

The floor is nailed directly to the joists or furring strips and is laid in straight lines across the room as if it were level, as the boards will spring enough so as to get the dished shape unless the inclination be too great, when a number of them will have to be shaped. Of course, the ends of the boards will have to be cut at a mitre so as to fit nicely against the wall. The boards should be well nailed so as to prevent the tendency to spring back to a level position.

Pew ends can now be bought ready made from a number of mill supply houses at such a low price that it is not profitable to make them oneself. With these ends it is only necessary to get proper lengths of seats and backs and fasten together to complete a pew.

Testing Oil and Paint.

Editor Practical Carpenter:

What is the best method to test linseed oil to see if it is pure, also white lead and zinc white.

Arnold Huisenfeldt.

Fill a narow bottle with the oil to be tested and hold it up to the light; if bad it will be opaque and cloudy, its taste will be acid and its smell rancid. The oil which is squeezed out of good, full grown seeds should, when held up to the light, appear clear, pale and bright, is sweet to the taste, and has little or no smell.

To tell if any sample of paint is lead or zinc put it into a gas flame. If it is lead it will turn brown by the action of the sulphuretted hydrogen of the gas; if it is zinc, it will keep white and not turn its color.

To find out with what substances white lead may be adulterated would necessitate a chemical analysis, but the following directions will enable one to test if there is any adulteration.

Rub a portion of the lead in a little sulphuric acid on a piece of glass with a bone pallette-knife; if it is free from adulteration, and a good lead, it will mix to a smooth paste, free from gritty substances.

To test zinc white place a small piece on an iron spoon and apply the flame of a blow pipe to it until it is burned to a white dry powder, squeeze this until it is very fine.

Now take a small bottle having a solution of 10 parts of water and 1 part nitric acid and let a little of the fine powder fall into it. If it is pure zinc it will dissolve almost immediately, without bubbling or effervescing. If it should bubble or not dissolve it has been adulterated.

TO PREVENT GLUE CRACKING.

Glue frequently cracks because the dryness of the air in the rooms warmed by stoves. The addition of a little chloride of calcium to glue will prevent this disagreeable property of cracking. Chloride of calcium is such an absorbing salt that it attracts enough moisture to prevent the glue from cracking.

TO KEEP TOOLS FROM RUSTING.

Take 2 ounces of tallow and 1 ounce of resin; melt together and strain, while hot, to remove the specks which are in the resin. Apply a slight coat on the tools with a brush and it will keep off the rust for any length of time.

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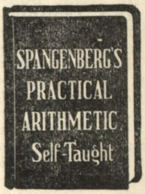

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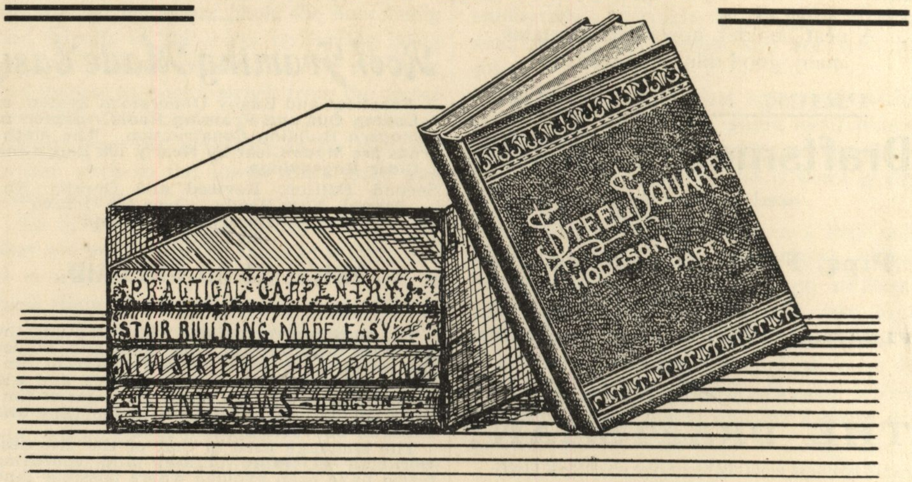

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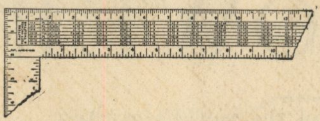

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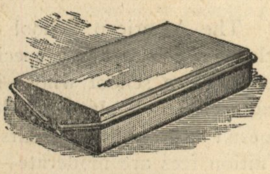

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